Recommendations

1.3.1. Work with other interested institutions to define the special technical and policy problems created by electronic publishing and to develop strategies for minimizing those problems. Specific issues that NLM and others must address include:

- Future availability of material published in electronic form.
- Standards for the production of electronic media.
- Retention and storage of raw data (text, numeric, and graphic) files.
- Potential disappearance or alteration of information through updating of electronic publications in the scholarly record.

Budget

Estimates of resources needed to implement these recommendations are given in Chapter 4.

Domain 2:

Locating and Gaining Access to Medical and Scientific Literature

The fundamental rationale for the NLM's mission recognizes that health is a national priority and that health research is a national investment. To realize the full benefit from that investment, every possible means must be taken to stimulate the effective dissemination of research results. Therefore, NLM is responsible not only for collecting and organizing the biomedical literature, but also for ensuring access to it.

Traditionally, NLM has aided the dissemination of biomedical research results through the distribution of its authoritative indexing and cataloging information, which enables health professionals to identify the literature relevant to their information needs, and through systems and services which help health professionals locate and obtain the relevant documents they have identified. Today, NLM's descriptions of the content of the biomedical literature are readily available to health professionals throughout the world and are consulted millions of times each year. DOCLINE, an NLM-developed automated document request and referral system,[22] facilitates the process by providing automatic routing of information requests through the national RML (Regional Medical Library) Network.[23]

Although access to information by health professionals has improved dramatically through the efforts of the NLM and the RML Network,[24] technological advances of today and the future present new opportunities for more effective and efficient information service. Increasingly, biomedical information is being created and maintained in electronic format by an overwhelming variety of sources. Enhanced networks that provide the health professional with gateways to relevant information on a variety of

disparate computer systems will be required, as will specialized networks that provide integrated information for health science centers such as those being studied under the IAIMS (Integrated Academic Information Management Systems) program.[25,26] Since health professionals will be accessing these networks directly, search software needs to be adapted to the knowledge and terminology of the user. Overall, information services to health professionals must become more flexible and intelligent.

The libraries of the future must evolve into a powerful interlocking system of networks that will coordinate and facilitate the linking of relevant information resources and the users of this information. Both the information providers and the health professionals will need training to take full advantage of new electronic storage and dissemination tools.

Goal 2.1:
Make Information More Accessible To Health Professionals

The continued growth in the biomedical literature and the increasingly interdisciplinary nature of scientific research require that health professionals have access to a wide range of information from many different sources. A strong and effective communications network that provides access to all that information is essential.

The Regional Medical Library Network has been an invaluable tool for facilitating access to the literature for health professionals. It will have a far greater potential if the Network takes advantage of the new technologies and serves as a test bed for new health information delivery systems. Working together, NLM and the RMLs can expand the existing document delivery system into a nationwide automated document request and routing system.

While the RML Network is interinstitutional, the IAIMS initiative is developing integrated networks and linkages within institutions. There is widespread recognition that health sciences libraries across the country will need to assist in the development of such networks for biomedical institutional environments. These networks, however, need not be identical or even parallel since institutional and individual needs differ from location to location.[27,28]

The strength of the communications networks of the future will depend on the use of appropriate standards and principles for storing and transmitting information that are broadly accepted in the biomedical information world so that internodal access and transfer of data and knowledge can be efficient, reliable, and speedy. NLM will be in a position to establish standards in some areas, and to support the efforts of national and international bodies to do so in others.

For NLM to remain a leader in applying new technologies, it must continue strong support of research and development activities, and undertake projects using the technologies to solve some of its own problems. The development of gateways (composed of a set of computer commands that permit a user to access relevant data bases) will provide the kind of easy information access that is essential to meet the needs of tomorrow's health professionals.

Recommendations

2.1.1. Enhance the Regional Medical Library Network to assure that it is able to use emerging technologies and to serve successfully as a test bed for new communications systems.

2.1.2. Continue to support IAIMS planning, model development, and implementation efforts in a limited number of institutions, and disseminate information about the experiences of these institutions.

2.1.3. Make research grants and contracts for the development of intelligent interfaces for gateways to increase access to information. Expand the intramural research program in this area.

2.1.4. Work cooperatively with selected relevant data base producers to create linkages, reduce production costs, and to otherwise facilitate access to relevant health information.

2.1.5. Develop an electronic gateway function that will link users of the MEDLARS system to information in a variety of relevant data bases.

Goal 2.2:
Provide Enhanced Information Products And Services To Assist Health Professionals And Biomedical Scientists

NLM should expand its existing reference and document delivery services. The traditional pattern of referring unfilled requests to larger collections may not be the most effective model for locating and obtaining information in the coming decades. Specialized collections and special expertise may be identified at many points in the network. While this is currently done informally, sources of knowledge for reference referral should be identified more systematically. In addition, the existing document delivery network could be improved by allowing the user to request an actual copy of a journal article in the course of a MEDLINE search. Links to other networks (not only in biomedicine) might also enhance document delivery service to the user.

NLM should develop systems to improve access to electronic information. These systems will simplify access to bibliographic data by assisting with the formulation of information queries and will help health professionals obtain quick, inexpensive, accurate answers to specific questions. GRATEFUL MED,[29] NLM's software for helping health professionals search MEDLINE[30] easily using a personal computer, should be enhanced.

NLM should continue to explore the information needs and information seeking behavior of health professionals and biomedical research scientists. Each such user requires different information depending on the type of practice, type of disorder seen or studied, characteristics of the patient or phenomenon observed, and the pace of new scientific discovery in the field. For NLM to enhance its products and resources, these factors, as well as the relationships between access to information and the quality of patient care and discovery in science, must be examined.

It is also important to recognize that many of NLM's users are from outside the United States. The Library's international programs not only extend access to NLM information services beyond U.S. borders, but they also make worldwide information available to U.S. users.[31]

Recommendations

2.2.1. Enhance GRATEFUL MED and develop other user cordial systems to facilitate direct access to biomedical information.

2.2.2. Explore the development of special knowledge-based systems to help information providers develop improved methods of information access.

2.2.3. Provide more systematic ways to refer requests for scientific information from individuals and organizations to the sources of relevant information.

2.2.4. Expand the existing document delivery system to provide more comprehensive resources and to make effective use of technologies such as telefacsimile, laser disk, and textual material in electronic form.

2.2.5. Provide an online index to special knowledge-based systems in biomedicine.

2.2.6. Encourage basic and applied research to identify health professionals' need for, access to, evaluation of and use of biomedical information, and where feasible, examine the relationship between access to information and the quality of patient care.

2.2.7. Provide assistance to other countries in identifying and gaining access to biomedical information in the U.S. Also assist U.S. health-care professionals in accessing information developed outside this country.

Goal 2.3:

Continue To Support The Training Of Medical Librarians And Other Information Specialists To Prepare Them To Adapt New Technologies To The Needs Of The Biomedical Community.

The evolving electronic environment will require medical information providers to develop new specialized knowledge, skills, and expertise. NLM should continue support as necessary to prepare information providers to adapt the new electronic storage and dissemination methods to the needs of the biomedical community. New prototype educational programs that emphasize integrated information concepts and the application of new technologies to information dissemination are necessary. Master's-level library and information science programs should be upgraded to provide the knowledge needed to develop and use automated libraries and data bases in biomedicine. Practicing information professionals need continuing education opportunities to upgrade their knowledge base.[32]

Recommendation

2.3.1. Institute new prototype programs containing special curricula in U.S. library and information science schools that emphasize integrated information concepts and the application of new technologies to information dissemination.

Goal 2.4:

Review The Public's Need For And Access To Health Information

Given the current emphasis on individuals assuming a stronger role in their own health care, and the shift in emphasis from disease treatment to prevention, the lay public's need for and access to health information should be reviewed. If feasible, NLM should apply limited resources to improving public access to health information.

There are many sources of health information for the lay public, including other agencies within the Department of Health and Human Services, other government agencies, professional societies, hospitals, and popular literature. Much of that literature takes the form of pamphlets and other publications for which bibliographic control is not easily achieved. Furthermore, it is often difficult to determine if the information provided is authoritative and current.

Recommendations

2.4.1. Study the current sources of health information for the public and the potential role for NLM in this area.

2.4.2. Augment DIRLINE (NLM's online directory) to provide a more complete directory of sources of health information for the lay public.

Budget

Estimates of resources needed to implement these recommendations are given in Chapter 4.